

4.7 Upland Disposal/Reuse Alternatives

4.7.1 Screening Process

The purpose of the upland disposal site screening process is to identify sites where disposal of dredged material would be feasible and be the least environmentally damaging to the natural and human environment. This was accomplished by employing a tiered screening process depicted in Figure 4-7. The screening follows the guidelines of 40 CFR Part 230, established under Section 404(b)(1) of the Clean Water Act (CWA) and complies with 310 CMR 16.00 (Site Suitability Regulations) for dredged materials classified as solid waste by DEP (MDPW, 1990).

The first tier involved the establishment of a Zone of Siting Feasibility (ZSF), which determined the general area that was to be studied for site selection. The ZSF was established based upon a reasonable truck travel distance from Gloucester Harbor. A 50-mile ZSF (Figure 4-13) was established because it is the maximum distance a truck could travel to and from the dewatering site in a normal 8-hour working day. This included the time for loading and offloading at the dewatering site and disposal site, respectively. The upland ZSF includes: most of eastern and southeastern Massachusetts, extending as far west in central Massachusetts as I-495; and most of the New Hampshire coastline to the north. Commercial landfills within these states were also investigated.

The universe of upland sites was compiled from the following sources, including several previous siting studies that have been conducted for dredged material disposal and disposal/reuse of other materials:

- C Boston Harbor Navigation Improvement Project
- C Central Artery/Tunnel Project
- C MWRA Residuals Management Facility Plan
- C DEP Active Municipal Solid Waste Landfills and Active Demolition Landfills in Massachusetts
- C DEP Inactive or Closed Solid Waste Landfills in Massachusetts
- C Massachusetts Division of Capital Asset Management Inventory of State-Owned Properties
- C Lists of active landfills in Connecticut, Maine, New Hampshire and Rhode Island
- C Meetings and conversations with local, state and federal agencies
- C Requests for Expressions of Interest in major newspapers
- C Requests for Expressions of Interest mailed to every municipality within the ZSF

This compilation resulted in a universe of 1,123 sites within the ZSF. These sites were then subjected to a feasibility screen, where sites that were smaller than the minimum size required to accommodate a certain volume of dredged material were eliminated.

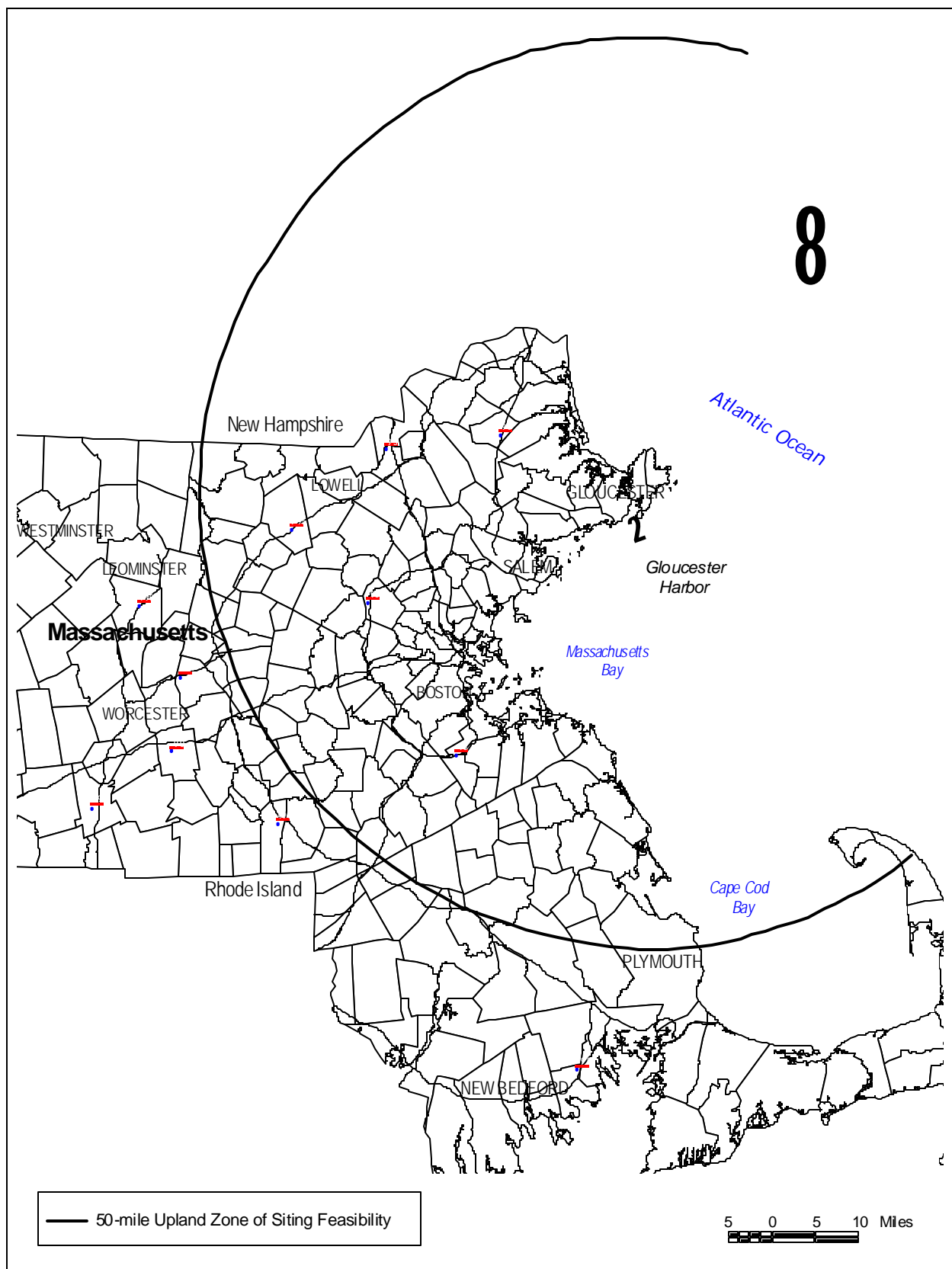


Figure 4-13. Upland Zone of Siting Feasibility

The criteria for determining the minimum disposal site size was based upon two primary factors:

1) the minimum area required to accommodate 10,000 cy of dredged material; and, 2) setback distances for solid waste management facilities as specified in the Massachusetts DEP Solid Waste Management Regulations at 310 CMR 19.000. The 10,000 cy minimum volume was selected because it is the threshold for triggering environmental review under MEPA and it is a volume that is typical of smaller marina dredging projects along the North Shore. A 500-foot buffer distance from the potential disposal area to adjacent properties was assumed as per DEP regulations. This resulted in a minimum disposal area of 25 acres. Any of the 1,123 sites less than 25 acres in size were eliminated. There were 270 sites eliminated based upon this criteria, leaving 853 remaining candidate sites.

The candidate sites were screened through a series of exclusionary criteria that examined factors that would essentially prohibit upland disposal based upon state or federal law or regulation. The close proximity to drinking water supplies, is an example of an exclusionary criteria which, would precludes the area from use as a disposal site. After applying the five exclusionary criteria (discussed in Section 4.7.2.1) 837 additional sites were eliminated, leaving 9 potential alternatives within the 50-mile ZSF. Two additional sites located just outside the ZSF were added because one is an active landfill and the other, although inactive, has accepted dredged material in the recent past. Therefore, 11 potential alternatives are carried forward for further analysis.

The potential alternatives were then evaluated based upon a set of secondary or discretionary criteria, consisting of 15 factors that could affect the feasibility and potential impacts of a disposal site. These factors are shown in the upland site data sheets (Figure 4-14) and are described in Section 4.7.2.1.

Each of the potential alternative sites (Figure 4-15) were then compared, relative to one another, using the discretionary criteria. Finally, DEP policies and regulations related to waste disposal were applied to the set of potential alternatives to determine the relative feasibility of each site for accepting dredged material.

4.7.2 Screening Factors

In conclusion, after sites were eliminated based upon size and capacity in the feasibility screen, the candidate sites were then screened using a set of exclusionary criteria. The potential sites still remaining after these two initial screening processes were then evaluated using a set of discretionary criteria, which included the feasibility of obtaining approvals for these sites based upon existing DEP policies and regulations regarding waste management.

UPLAND DISPOSAL SITE SCREENING		
SITE LOCATION		
HARBOR:	SITE NAME:	
SITE COORDINATES:		
PHYSICAL CHARACTERISTICS		
Disposal Type(s): Potential Capacity (cy x10 ³): Present Land Use: Adjacent Land Use (U-15): Physical Area of Impact (acres) (U-9):		
Site Accessibility (U-8):		
Route	Distance	Logistics
[Including time of transport, road types, rehandling, and storage]		
Trucking Limitations:		
Duration of Potential, Adverse Long-term Impacts (U-10):		
Duration	Severity	Comments
Existing Terrain (U-12):		
Topographical Characteristics	Comments	
[Including suitability for diking]		
DESIGN CHARACTERISTICS		
Ability to Obtain Permit (U-19):		
Consistency with Federal Regulations	Consistency with State Regulations	
Risk of Containment Facility Failure (U-16):		
Geotechnical Stability	Foundation Stability	Comments
Consistency with Local, Regional, and State Plans (U-18):		
Values	Site-specific Uses	

Figure 4-14: Example of Upland Disposal Site Data Sheet

Estimated 20 year Cost (U-20):		
Construction	Maintenance	Monitoring

EXCLUSIONARY USE FACTORS			
Critical Habitat for Federal or State, Rare and Endangered Species (U-1):			
Species	Designation (S/F)	Habitat Use	Seasonality
		[Breeding/Resident/ Migratory/Habitat]	

Historic/Archeological Sites or Districts (U-2):	
Type of Site	Significance of Features

Drinking Water Supply – Groundwater (U-3):	
Zone II	Sole Source Aquifer

Drinking Water Supply – Surfacewater (U-4):	
More than 0.5 Miles Upgradient nearest source	Comments

National Seashore (U-5.a):		
Name	Distance	Comments

Wilderness Area (U-5.b):			
Name	Distance	Type	Comments

ACEC's (Areas of Critical Concern) (U-5.c):			
Name	Distance	Type	Comments

Figure 4-14: Example of Upland Disposal Site Data Sheet (continued)

DISCRETIONARY USE FACTORS		
Groundwater - General (U-6):		
Depth to Groundwater	Comments	
Surface Water - Rivers (U-7.a):		
Name	Distance	Potential for Water Quality Degradation
Surface Water - Wetlands (U-7.b):		
Name	Distance	Potential for Water Quality Degradation
Flood Plains (U-13):		
Percent Coverage, 100 year	Comments	
Agricultural Use (U-14):		
Description	Comments	
Odor/Dust/Noise Receptors (U-17):		
Name/Description	Distance	Comments
BIOLOGICAL USE FACTORS		
Present Habitat Types (U-11):		
<i>Summary Type:</i>		
<i>Recovery Potential:</i>		
Successional Stage (U-11.a):		
Disturbance (degree) (U-11.b):		
Plant/Animal Diversity (U-11.c):		
Plant/Animal Integrity (U-11.d):		
Landscape Position (U-11.e):		
Wildlife Function/Use (U-11.f):		

Figure 4-14: Example of Upland Disposal Site Data Sheet (continued)

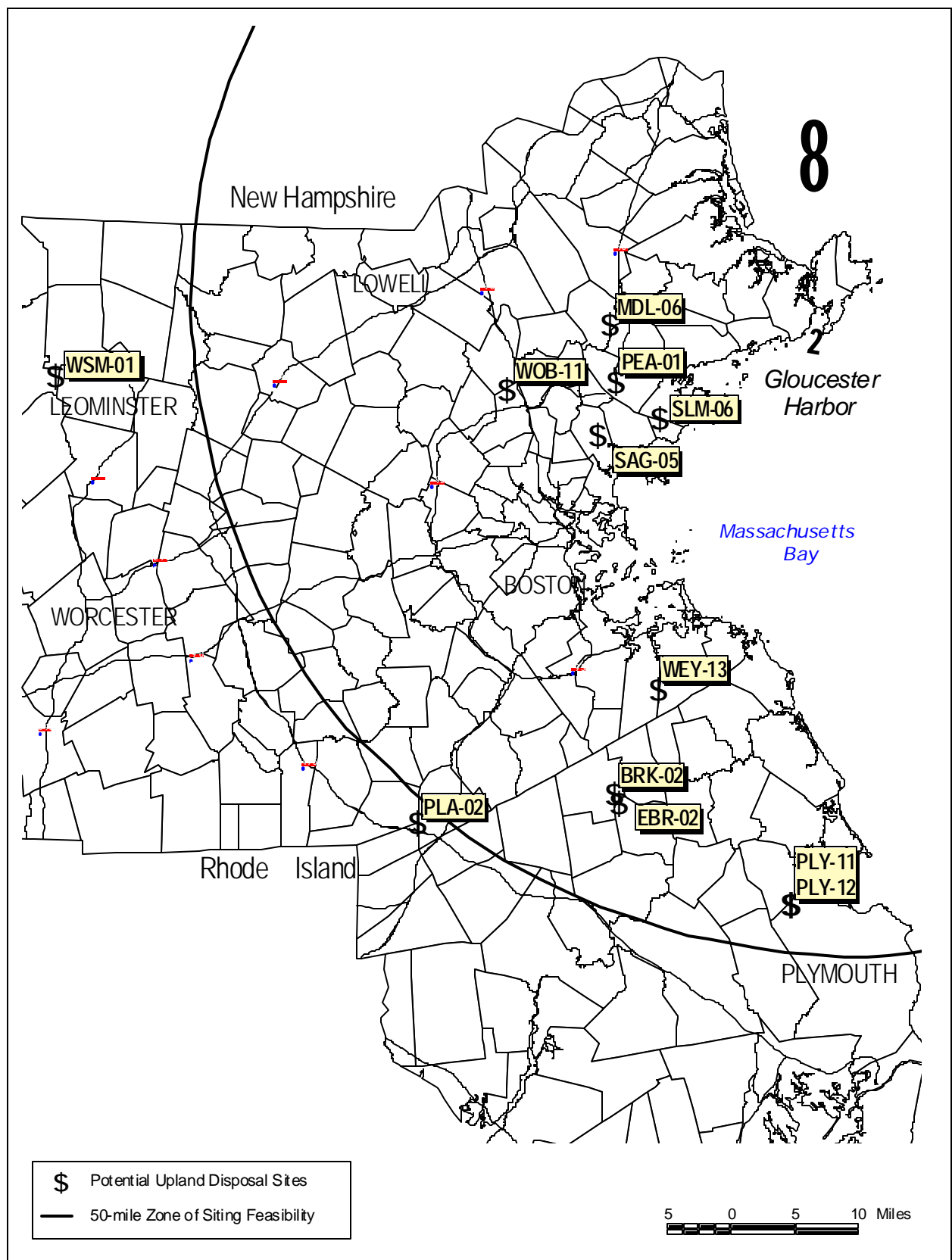


Figure 4-15. Potential Upland Disposal Sites

4.7.2.1 Exclusionary Factors

The following exclusionary factors were applied to those sites 25 acres in size or greater, i.e. the candidate disposal sites:

U-1. Threatened and Endangered Species - (Critical habitat or resource-use area for federal or state listed threatened or endangered species or species of special concern) - The locations of the sites identified in the initial screening were identified in the Massachusetts Natural Heritage Atlas which utilizes information from the USFWS to map and list these state and federal species.

U-2. Historic/Archeological Sites or Districts - The sites were evaluated for potential cultural resource constraints through consultation with the Massachusetts Historical Commission and review of any local, State or National designations for the site.

U-3. Drinking Water Supply - Groundwater - Sites were evaluated for proximity to an area with groundwater with Zone II or III designation (DEP) and Sole Source Aquifer (SSA) designation (EPA). Under 310 CMR 22.00, local zoning regulations are required to prohibit certain land uses, including landfills, from being sited within Zone II and III wellhead protection areas. Under 310 CMR, there are allowance for variances from these strict land use controls depending on a variety of factors including water supply status (public or private), population served, and frequency of use. Also, there are a range of setback considerations that could affect the feasibility of siting a landfill. For a macroscale study such as this upland disposal analysis, these potential variables were not factored into the analysis, therefore, areas with a Zone II or III designation were excluded from siting a dredged material disposal facility.

A SSA is an aquifer designated by the United States EPA as the sole or principal source of drinking water for a given aquifer service area and which is needed to supply 50% or more of the drinking water from that area and for which there are no reasonably available alternative sources if that aquifer became contaminated (United States Environmental Protection Agency, 2000).

U-4. Drinking Water Supply - Surface Water - Sites were evaluated for proximity to public drinking water supplies, location within one-half mile upgradient of a surface water supply, potential pollutant pathways to a water supply, and potential for water quality degradation.

U-5. Land Designation

U.5.a - National Seashore - Sites were evaluated for federal designation as a National Seashore. Massachusetts Solid Waste Regulations, 310 CMR 19.000, prohibit placement of unsuitable material in a designated National Seashore area.

U.5.b - Wilderness Area - Sites were evaluated for federal designation as a Wilderness Area. Massachusetts Solid Waste Regulations, 310 CMR 19.000, prohibit placement of unsuitable material in a designated Wilderness Area.

U.5.c - Area of Critical Environmental Concern (ACEC) - Sites were evaluated for state designation as an Area of Critical Environmental Concern (ACEC). ACECs are areas containing concentrations of highly significant environmental resources that have been formally designated by the Commonwealth's Secretary of Environmental Affairs for preservation and enhancement of the land's natural assets (Massachusetts Department of Environmental Management, 2000) (301 CMR 12.00). Massachusetts Solid Waste Regulations, 310 CMR 19.000, prohibit placement of unsuitable material in an ACEC.

4.7.2.2 Discretionary Factors

The following discretionary factors were used to evaluate the 11 potential upland disposal sites that survived the exclusionary criteria screening process.

U-6. Groundwater - General - Evaluation of the types of aquifers in the vicinity and depth to groundwater at the site.

U-7. Surface Water Quality

U.7.a - Water Bodies and Rivers - Evaluation of the sites' setback (distance of the site from the shoreline) from waterbodies and rivers.

U.7.b - Wetlands - Evaluation of setback of sites from wetland resource areas.

U-8. Site Accessibility - Description of the most practical route to transport dredged material to the disposal site, including any potential logistical problems that might be encountered during use or construction of the proposed site. Sites should be directly accessible from a regional highway, have a rail or navigable waterway nearby, have a local access route that does not include lateral or vertical obstructions or restrictions, and have a local access route that does not pass by sensitive receptors.

U-9. Physical Area of Impact - Evaluation of the amount of land area in acres that would be directly affected by disposal activities.

U-10. Duration of Potential, Adverse Impacts - Estimation of recovery time based on the type of disposal and present site conditions.

U-11. Present Habitat Types

U-11.a - Successional Stage - Evaluation of vegetation stage (e.g., forest, grass) and whether wetlands were present.

U-11.b - Degree of Disturbance - Evaluation of the visual evidence of site disturbance, including physical disruptions such as land clearing or development; and ephemeral disturbances such as noise or temporary land usage.

U-11.c - Diversity of Plant and Animal Species - Evaluation of the type and amount of vegetative cover to estimate species diversity, highlighting the presence of wetlands on or adjacent to the site, and considering influence of topography and soil types.

U-11.d - Integrity of Plant and Animal Communities - An evaluation of the plant and animal community integrity by considering the degree of disturbance that the site and the surrounding landscape conditions, and their potential impact on the habitat and species of native flora and fauna at the site.

U-11.f - Wildlife Function - Assessment of wildlife value by considering degree of disturbance and landscape position as well as the presence of breeding, feeding, resting/roosting areas, presence or connectivity to dispersal areas, presence of food and cover, and other wildlife attributes.

U-12. Existing Terrain (suitability for diking) - Determination of ability to construct a dike around disposed sediment in light of existing terrain.

U-13. Flood Plains - Determination whether site is within or partially within a designated floodplain, consulting National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRMs).

U-14. Agricultural Use - Determination of prime agricultural soils on or near the site.

U-15. Adjacent Land Use - Evaluation of adjacent ownership, present and projected land use.

U-16. Risk of Containment Facility Failure - Review of characteristics and engineering requirements for each site to assess the potential stability of material disposed of at the site.

U-17. Odors / Dust / Noise - Evaluation based on proximity of odors, dust and noise generated on-site to sensitive receptors such as residential areas, schools, cemeteries, etc.

U-18. Local, Regional, State Plans - Evaluation of consistency with local, regional and state long range plans.

U-19. Ability to Obtain Permits - Evaluation of likelihood of local, state, and federal regulatory approval.

U-20. Cost - Estimation of comparative costs for construction, maintenance, and monitoring of proposed sites.

SECTION 4.0 - ALTERNATIVES ANALYSIS

Table 4-4: Summary of Exclusionary (E) and Discretionary (D) Screening Factors for Upland Disposal/Reuse

SCREENING FACTORS	EVALUATION CRITERIA	GOAL
PRE-SCREENING		
<i>Geographic Area</i>	50-mile radius; Beyond MA state boundaries, only commercial opportunities were considered	Maximize proximity to dredging activity
<i>Capacity</i>	>10,000 c.y	Maximize capacity
INITIAL SCREENING (E)		
<i>U-1. Rare and Endangered Species</i> 310 CMR 16.00, 19.00	Rare or endangered species habitat	Avoid rare or endangered species habitat
<i>U-2. Historical/Archaeological Sites</i> 310 CMR 16.00, 19.000	Presence of Local, State, or National Historic Site	Avoid Local, State, or National Historic Sites
<i>U-3. Drinking Water Supply - Groundwater</i> 310 CMR 16.00, 19.000, 22.21	Proximity to Zone II and Sole Source Aquifer	Avoidance of Zone II and Sole Source Aquifer
<i>U-4. Drinking Water Supply - Surface Water</i> 310 CMR 16.00, 19.000, 22.21	Setback greater than ½ mile up gradient of water supply	Beyond ½ mile upgradient
<i>U-5. Land Designation</i> <i>U-5.a - National Seashore</i> E - 310 CMR 16.00, 19.000 <i>U-5.b - Wilderness Area</i> E - 310 CMR 16.00, 19.000 <i>U-5.c - Area of Critical Environmental Concern(ACEC)</i> E - 310 CMR 12.00, 16.00, 19.000	National Sea Shore Designation (Federal) Wilderness Area Designation (Federal) ACEC Designation (State)	Avoid designated sites. Avoid designated sites. Avoid designated sites.
SECOND TIER SCREENING (D)		
<i>U-6. Groundwater - General</i> D	Depth to groundwater	Maximize separation distance
<i>U-7. Surface Water</i> <i>U-7.a - Water Bodies and Rivers</i> D <i>U-7.b - Wetlands</i> D	Setback from river, water quality degradation Setback from wetland, water quality degradation	Protect river quality Protect wetland quality
<i>U-8. Site Accessibility</i> D	Trucking limitations, length, time to transport, road types, re-handling, storage	Minimize disruptions Maximize efficiency Reduce risks of re-handling
<i>U-9. Physical Area of Impact</i> D	Size of area affected	Minimize area adversely affected
<i>U-10. Potential Adverse Long-term Impacts</i> D	Time, severity, recovery period	Minimize impacts

Table 4-4: Summary of Exclusionary (E) and Discretionary Screening Factors for Upland Disposal/Reuse (Continued)

SCREENING FACTORS	EVALUATION CRITERIA	GOAL
<i>U-11. Present Habitat Types</i>		
D <i>U-11.a - Successional Stage</i>	Existing conditions	Long-term protection of advanced stage or climax communities and utility over pioneers
D <i>U-11.b - Disturbance (degree)</i>	Existing conditions	Long-term protection of undisturbed sites or sites with least disturbance
D <i>U-11.c - Plant/Animal Diversity</i>	Existing conditions	Long-term protection of sites with greatest diversity.
D <i>U-11.d - Plant/Animal Integrity</i>	Existing conditions	Long-term protection of sites with stable populations of native, non-invasive and diverse flora and fauna
D <i>U-11.e - Landscape Position</i>	Existing conditions	Assure long-term compatibility with adjacent environment types and land use
D <i>U-11.f - Wildlife Function /Use</i>	Existing conditions	Long-term protection of sites which support the greatest number of critical life functions
<i>U-12. Existing Terrain</i> D	Existing terrain suitable for diking	Maximize long-term secure containment
<i>U-13. Flood Plains</i> D	Avoid impacting flood plain	Retain flood storage capacity
<i>U-14. Agricultural Use</i> D	Existence of prime agricultural soils/ agricultural use	Avoid impacting resources
<i>U-15. Adjacent Land Use</i>	Ownership, present and projected use	Maximize long-term retention of greenspace/retain long-term availability
<i>U-16. Facility Failure</i> D	Geotechnical stability, foundation stability	Maximize stability/containment of material
<i>U-17. Odors / Dust / Noise</i> D	Proximity to receptors of odors, dust and noise.	Maximize distance to receptors
<i>U-18. Local, Regional, State Plans</i> D	Consistency with applicable plans	Avoid conflict with long range plans
<i>U-19. Ability to Obtain Permit</i> D	Likelihood of obtaining local, state, and federal approvals	High probability of obtaining necessary approvals
<i>U-20. Cost</i> D	Estimated 20-year cost of construction, maintenance, monitoring	Minimize long-term costs.

4.7.3 Screening Results

Using the methodology and criteria described above, the initial screening narrowed the universe of sites. This initial screening of the Massachusetts sites was conducted using the following reference sources:

- C Massachusetts Geological Information Systems (MassGIS),
- C United States Geologic Survey Topographic Maps,
- C Massachusetts National Heritage Atlas,
- C Massachusetts Historic Commission maps,
- C Bureau of Waste Site Cleanup Sites Transition and Reportable Releases Lists,
- C Information gathered in previous reports and databases, and
- C Information obtained about sites within the municipal limits of the harbors at meetings with town officials.

Over 1,000 sites within Massachusetts had exclusionary constraints, causing them to be eliminated. Table 4-5 summarizes the results of the initial screening.

The remaining 11 sites either did not have exclusionary constraints or were active commercial landfills or contaminated sediment treatment facilities and therefore could potentially be used as a disposal site for dredged material.

Because the 50-mile ZSF extended into portions of New Hampshire, active commercial landfills within this state were considered. There are no active commercial landfills in New Hampshire within the ZSF, however the Waste Management Turnkey facility in Rochester, NH has expressed interest in accepting UDM from Gloucester Harbor for use as grading/shaping material. This facility is about 80 miles from Gloucester. It has three landfills; two are closed and the third is in the process of being capped. The fourth will be constructed to take material until 2002. The rate of disposal at the 3rd and 4th is 750,000 - 900,000 tons/year. UDM may be suitable as internal slope cover. Under New Hampshire regulations, out-of-state material that has been rejected for disposal within the state of origin cannot be accepted at the facility. Additional testing would be needed on the UDM to determine its acceptability for landfill disposal.

Waste Management also operates the Crossroads facility in Norridgewalk, ME. This landfill is licensed to accept dredged material, but it is about 190 miles from Gloucester Harbor.

Table 4-5: DMMP Upland Disposal Site Exclusionary Screening Summary

Site Sources:	Active Landfills	BHNIP	CA/T	DCAM	Planning Depts.	Inactive Landfills	RMFP	UR Parcels	Total Sites
<i>Candidate Sites</i>	37	12	6	380	3	368	312	5	1,123
<i>Sites Failing Exclusionary Criteria:</i>									
Capacity/Status	25	4	0	11	0	162 (2)	67	1	270 (2)
Rare and Endangered Species	0	0	0	37	0 (1)	23	21	0	81 (1)
Zone II Aquifer	1	2	1	19	0	30	71	0	124
Sole Source Aquifer	2	0	1	4	0	17	15	0	39
Surface Water Source	0	0	0	2	0	9	5	0	16
National/Historical Monument	2 (1)	0	0	11	1	62 (1)	68	0	144 (2)
National Seashore	0	0	0	0	0	0	0	0	0
Wilderness Area	1	1 (1)	1	280	1 (1)	37 (1)	59	2	382 (3)
ACEC	0	2	0	31	0	15	14	2	64
21E Site	3 (1)	2	3	4	0 (1)	16 (1)	13	0	41 (3)
Screened by Agency Action	2	1	1	0	0	56	16	0	76
<i>Sites Eliminated</i>	35 (1)	10 (1)	6	378	2 (1)	362 (4)	309	5	1107 (7)
<i>Potential Alternatives:</i>									
in Massachusetts ⁴	2	2	0	2	1	6	3	0	16
outside Gloucester ZSF									-7
outside ZSF but considered									+2
within Gloucester ZSF									11

Notes:

1. Sites in parentheses failed the exclusionary screening, but were not eliminated because of their potential as disposal sites.
2. Some sites failed more than one criterion.
3. A site would fail due to capacity/status if: site is smaller than 25 acres, site has capacity less than 10,000 cu yd, site is too narrow to accommodate landfill construction, site has been developed (e.g. residences, industrial park, highway), landfill is closed and capped, landfill only accepts MSW, or site is no longer part of database that included it in this list.
4. Within the overlapping ZSFs of MA North Shore and South Shore Harbors.

Site Sources:

Active Landfills - Active MSW Landfills and Active Demolition Landfills in Massachusetts (DEP, April 1998), Connecticut Active Landfill Sites (CT DEP, February 1998), Rhode Island Licensed Solid Waste Landfills (RI DEM March 1996). Landfills Operating - 1997 (NH DES, November, 1997), and Maine: Operating Landfills (Maine DEP).

BHNIP - Boston Harbor, Massachusetts: Navigation Improvement Project and Berth Dredging Project (April 1994).

CA/T - Central Artery/Tunnel Project: Results of Upland Disposal Site Screening Study (November 1990).

DCAM - Massachusetts Division of Capital Assets Management (formerly Division of Capital Planning Operations) Sites.

Planning Depts. - Suggested during meetings with members of Salem Planning Office (December 8, 1998) and Gloucester Planning Office (December 15, 1998).

Inactive Landfills - Inactive or Closed Solid Waste Landfills in Massachusetts (DEP, April 1998).

RMFP - MWRA Residual Management Facilities Plan (MWRA, 1986 and Black and Veatch, 1987).

UR Parcels - Massachusetts Highway Department Uneconomic Remainder Parcels.

4.7.4 Potential Alternatives

The 11 potential upland sites in Table 4-6 have been identified based on the initial screening. Detailed information about each of these sites can be found on data sheets in Appendix C. The detailed screening of these sites is presented below.

4.7.4.1 Detailed Screening of Potential Upland Disposal Sites

Map analyses, file reviews, and site visits were used to acquire more detailed information for each potential upland disposal site identified during the initial screening. Detailed information about each of these sites was recorded on the data sheets (see example, Figure 4-14 located in Appendix C. DMMP team members and representatives of local, state, and federal governments met and reviewed this information to review potential alternatives. Discretionary factors were discussed to determine the benefits and constraints of using each site.

The sites that survived the detailed screening are “Proposed Preferred Alternatives”. The discretionary evaluation criteria used during the second tier upland disposal site screening are outlined below, with more detailed discussion in section 4.7.2.

Existing Site Uses

Of the 11 potential sites, only one, WSM-01, is an active landfill. This site is currently being impacted by ongoing disposal activities, so the disposal of dredged material at the site would not greatly change the current land use. WSM-01 is surrounded by a state forest on three sides, with residences and undeveloped land abutting the other.

Five of the sites, EBR-02, PLA-02, BRK-02, WOB-11, SAG-05 and PEA-01 are either inactive or closed landfills. These sites are not pristine, having already been impacted by previous disposal activities. The streets leading to them have been used by heavy trucks during past disposal use, so truck access is relatively good. SAG-05 is an exception, because at this site, trucks would need to negotiate residential roads. Most of the sites are in commercial and industrial areas, with some residences nearby. Three sites, EBR-02, PEA-01, and SAG-05, have abutting residences. PLA-02 also has cranberry bogs northwest of the site.

There are four sites that would be new disposal areas, SLM-06, WEY-13, PLY-11/12, and MDL-06. Both SLM-06 and WEY-13 are active quarries in industrial areas, with some residences nearby. MDL-06 is mostly covered with cropland, and there are residences that abut to the north. PLY-11/12 is an undeveloped wooded site, with residences abutting the south side of the site.

Table 4-6: Potential Upland Disposal Site Characteristics

Site ID	Site Name	City	Present Site Usage	Distance from Gloucester (mi)	Capacity ⁸ (cy)	Cost ^{1,2} (\$/cy)
SLM-06	Bardon Trimount Quarry	Salem	active quarry	16	849,400	\$ 60-117
EBR-02	Northern Disposal BFI	E. Bridgewater	inactive lined landfill	42	711,100	\$60- 137
WOB-11 ³	Woburn Landfill	Woburn	unlined inactive	31	500,000	\$60 - 130
WSM-01	Westminster Landfill	Westminster	active lined landfill	68	282,700	\$60 - 134
WEY-13 ⁵	Bates Quarry	Weymouth	active quarry	44	189,600	\$60 - 169
PLA-02	Plainville Landfill	Plainville	inactive lined landfill	60	172,800	\$60 - 217
PLY-11/12	MHD ROW Parcel	Plymouth	undeveloped woods	47	124,400	\$60 - 238
MDL-06	DFA Middleton Colony	Middleton	open field	20	51,400	\$60 - 238
BRK-02 ⁷	Brockton Landfill	Brockton	unlined inactive	52	42,500	\$60 - 333
SAG-05 ⁴	Saugus Landfill	Saugus	inactive landfill	40	29,600	\$60 - 403
PEA-01 ⁶	NESWC Ash Landfill	Peabody	inactive landfill	25	10,900	\$60 - 683

¹ Cost includes dewatering, hauling, landfill construction and monitoring (does not include dredging)

Costs are for the creation of a new landfill or landfill area in accordance with MA Solid Waste Management Regulation guidelines.

² Cost for using UDM as grading/shaping material in active and inactive landfills is approximately \$60/cy

³ Landfill to be closed in 2 years per an administrative consent order

⁴ In process of closing. UDM not needed for closure.

⁵ Viable quarrying likely for the duration of the DMMP (20 yrs). Ponds (wetlands) present throughout quarry.

⁶ No longer accepting material

⁷ Landfill is closed

Groundwater

To avoid potential impacts to groundwater, sites located atop important groundwater resources were eliminated. Sites located within the Zone II (Zone of Contribution) of a public water supply well, within an Interim Wellhead Protection Area (IWPA), or within a Sole Source Aquifer failed the initial screening, in accordance with the Massachusetts Site Assignment Regulations for Solid Waste Facilities (310 CMR 16.00). None of the potential disposal sites are located above a Zone II, IWPA, or Sole Source Aquifer. The locations of potentially productive and other aquifers at or near the site were considered in the discretionary screening.

To further minimize the potential for the disposal of dredged materials to impact groundwater, the Site Assignment Regulations require that the disposal area be at least four feet above groundwater. At a site that has a shallower groundwater table, the disposal facility can be engineered so that there is at least 4 feet between the lower-most liner and the high level of groundwater.

As indicated above, any new disposal facility used or built would be lined to keep any leachate from the dredged material from coming into contact with groundwater. For unlined landfills, additional testing of sediments would be needed to determine if UDM leachate poses a threat to groundwater. Groundwater sampling via monitoring wells and laboratory analysis of the groundwater samples would be conducted to confirm that leaks into groundwater have not occurred.

Sites SLM-06, EBR-02, and WEY-13 have shallow depth to groundwater (< 4ft.) and, therefore, risk of groundwater contamination at these sites would be greatest (The two quarry sites, SLM-06 and WEY-13 are excavated pits and, therefore, are actually *below* the groundwater table).

Surface Water and Wetlands

While disposal of dredged material into freshwater wetlands is not absolutely prohibited, it would be difficult to obtain a permit for such an activity. For this reason, candidate upland disposal sites that are wholly or in large part covered with wetlands were eliminated from further consideration. However, sites that contain a minimal amount of wetlands were not, because disposal site design could avoid impacts to the wetlands. However, sites that do not contain any nearby wetlands would obviously be preferred over sites that are adjacent to wetlands.

Wetlands were identified through the use of U.S.G.S. Topographic Maps and the National Wetlands Inventory (NWI) mapping developed by the U.S. Fish and Wildlife Service. The NWI maps only identify and described relatively large wetlands (>5 acres), so other, smaller wetlands and vernal pools may be present at these sites. A site-specific field delineation would be required to define the regulatory limits of these wetlands.

All the potential disposal sites either contain or abut wetlands. The entire western perimeter of the BFI Landfill in East Bridgewater (EBR-02) is a shrub/scrub and forested wetland. The Ipswich River runs through the Middleton Colony Parcel (MDL-06). The southwest quadrant of the Brockton Landfill (BRK-02) contains a forested shrub/scrub wetland. The remaining eight sites either have small, isolated wetlands on site or have wetlands near the property borders.

Site Accessibility

Many of the potential upland disposal sites are existing active or inactive landfills or quarries and, therefore, access to the sites has been improved over the years to accept trucks carrying solid waste or raw materials.

Three of the inactive landfills (SAG-05, BRK-02, EBR-02) are accessed by residential roads, which is less preferred over sites that are accessed by roads that are engineered for industrial use (e.g. wide lanes, shoulders, multiple lane, gentle curve radii and sufficient lines of sight).

In terms of distance from Gloucester Harbor, SLM-06 is closest, while WOB-11, PEA-01, MDL-06 and SAG-05 are all within 20 miles. The remainder of the sites are beyond 20 miles, with WSM-01 the farthest away (48 mi).

Physical Area of Impact

The estimated footprint of UDM disposal at the potential disposal sites (Table 4-5) was estimated based on the existing topography of the land and engineering criteria established in the Commonwealth's Solid Waste Management Regulations. To receive 300,000 cy of UDM, disposal footprints for sites PLY-11/12, MDL-06, BRK-02, WOB-11, SAG-05 and PEA-01 would need to be 10 acres or less. Site EBR-02 would have the largest disposal footprint (48 ac). The quarry sites, SLM-06 and WEY-13, have expected disposal footprints of 18 and 14 acres, respectively. However, because they are pits, these footprints could be lessened depending on final engineering.

Duration of Potential, Adverse Impacts

Long term adverse impacts would be greatest at the new disposal sites. Sites MDL-06 and PLY-11/12 are both undeveloped parcels and would have the potential for the longest adverse impacts.

Present Habitat Types

Sites within or near productive, diverse, and undisturbed habitats are least preferred over sites with habitats that have been disturbed. Sites within existing or inactive landfills or quarries have undergone habitat disturbance already and, therefore, are preferred over sites such as MDL-06 and PLY-11/12, which are relatively undisturbed and undeveloped parcels of land.

To keep threatened and endangered species from being affected by the disposal of dredged material, sites containing their habitats failed the exclusionary screening. The Bardon Trimount Quarry (SLM-06) is the only site containing rare or endangered species habitat that was not eliminated, because the species of concern is located in the northern perimeter of the site, removed (400 feet) from the disposal area itself. The habitat covers approximately 5% of the entire property.

Of the remaining 10 sites, only one, PLY-11/12 has a rare, threatened or endangered species habitat, nearby. This habitat is located 0.25 miles away.

Existing Terrain (suitability for diking)

A disposal site for UDM can be engineered for practically any site conditions. However sites that are level or sites with existing topography that could easily contain dredged material (e.g. quarries, borrow pits) are preferred. As such, the quarry sites, SLM-06 and PLY-11/12, would be most effective in containing the dredged material because of the minimal need for dike/embankment creation. The existing landfills contain moderate to steep slopes, so additional side slope stabilization would need to be engineered. Of the two undeveloped sites (MDL-06 and PLY-11/12) the PLY-11/12 site contains slopes in excess of 8%.

Flood Plains

Five of the 11 potential disposal sites are wholly or partially within the 100-year flood plain. These are PLA-02, WEY-13, BRK-02, MDL-06, and EBR-02. All others are outside of the 100 and 500-year flood plain.

Agricultural Use

Two of the sites, BRK-02 and MDL-06 contain prime agricultural soils. All others do not contain prime agricultural soils, although PLA-02 and EBR-02 are within 500 feet of prime agricultural soils.

Adjacent Land Use

Sites in industrial or commercial areas are preferred over those in residential, agricultural, or recreational areas. Eight of the 11 sites are near residential, agricultural or recreational areas. Sites WOB-11, PEA-01 and SLM-06 are within industrial or commercial areas.

Portions of BRK-02, EBR-02, and SLM-06 are listed as Protected and Recreational Open Space, according to MassGIS. The first two sites were recently active landfills, so it is likely that the wilderness areas have already been impacted. At SLM-06, it is the area of the quarry that is listed as wilderness area, although the site is zoned as industrial, and large scale quarry activities have been going on for some time. Several other sites have undeveloped regions of the property where there may be potential for recreational activities such as hunting or fishing. These sites include PLY-11/12 and SAG-05.

Several sites abut protected and recreational lands. FRV-02 and WSM-01 are both active landfills situated next to state forests. MDL-06 abuts protected open space. These areas could potentially be negatively affected by disposal activities.

Facility Foundation Conditions

All sites have good foundation conditions for accepting UDM, except the Woburn Landfill (WOB-11), which has moderate foundation conditions. However, these conditions are not insurmountable with proper engineering.

Odors / Dust / Noise

Disposal sites that are close to residential, recreational, and tourist areas could be negatively affected by the odor, dust and noise created from a UDM disposal operation. Similar to the Land Use criteria discussion above, sites WOB-11, PEA-01 and SLM-06 would be preferred over the other eight sites because they are located in commercial or industrial areas.

Local, Regional, State Plans

Sites that, according to local, regional and state plans, are planned for continued use as disposal areas are preferred over sites that are not planned for use as disposal areas. Therefore, sites that are active landfills or quarries would be preferred over inactive sites or undeveloped land.

Ability to Obtain Permits

Because active landfills are currently operating with permits to dispose of certain materials (solid waste, ash), these sites would likely be the easiest for which to obtain the necessary state and local approvals (permits). It would be more difficult to obtain permits for inactive landfills because these sites were likely closed for environmental reasons. Undeveloped sites (raw land) such as MDL-06 and PLY-11/12 would likely be the most difficult to permit because of the stringent state and local regulations and policies for landfill siting. The ability to obtain a permit for a quarry sites (e.g. SLM-06 and WEY-13) is unknown, because the use of abandoned quarries for disposal of UDM has not occurred in Massachusetts. One of the key permitting issues is groundwater contamination because the UDM would be placed below the groundwater table, thereby potentially introducing contaminants to the groundwater.

Cost

Costs for disposal of UDM at the potential upland disposal sites would vary depending on the intended use of the material. For example, the cost for disposal of UDM that would be used as grading/shaping material for landfill closure purposes would be less than if the UDM were placed as a monofill at a landfill or raw parcel of land. There would be significant engineering measures needed for a monofill, similar to those used for construction of a solid waste landfill.

The landfills in Table 4-6 were contacted to determine their status, willingness to accept UDM, and the estimated cost for disposal. The cost for disposal of UDM as grading/shaping material will vary from site to site, but in general would be about \$60/cy (excluding dredging). This cost encompasses dewatering (\$20), hauling (\$15), and tipping fees (\$25) at the landfill. The lower cost for disposal as grading/shaping material versus solid fill is due to the fact that grading/shaping material is a *commodity* that is necessary for daily landfill activity or closure whereas disposal of large quantities of UDM uses up valuable landfill space that is reserved for solid waste.

Disposal of UDM at a landfill or undeveloped parcel would be much higher because of the many engineering, monitoring and permitting requirements (see cost breakdown in Appendix C) associated with the creation of a new landfill or landfill cell. These costs range from \$117 to \$683 per cubic yard (Table 4-5). The least expensive is SLM-06 (\$117/cy) and the most expensive is PEA-01 (\$683/cy). The construction of a new facility is generally more expensive than using an active landfill, due to the extra costs required to site, permit, build, monitor, and close the landfill (see Appendix C for itemized costs). Economies of scale also make building a facility at a small site, with minimal capacity, cost more on a unit cost level than a larger facility. This is in part because the same siting and permitting process is required for all sites. Berm height also becomes more economical with larger volumes, therefore, disposal of larger volumes results in a lower unit cost.

Historic and Archaeological Resources

There are no disposal sites that contain archaeological sites, but there is one site that is listed as historical. The active quarry itself at SLM-06 is listed as an historic site. If the site is used as a disposal site, the quarry would be at least partially filled.

PLA-02 and WSM-01 both have archaeological sites abutting their properties. WEY-13 abuts a historic site. All of these abutting historic and archaeological resources have likely already been impacted by the active or recent disposal and quarry activities at these potential disposal sites.

4.7.5 The Preferred Upland Disposal Sites

Upland disposal sites with respect to the discretionary criteria have been evaluated. As a result of the upland disposal site analysis, it has been determined that none of the 11 potential upland disposal sites would be considered preferred alternatives for disposal of UDM from Gloucester Harbor. Although some of the 11 sites have greater merit than others, none of the sites, either alone or in combination, satisfy the goals of the DMMP. There are several environmental, logistical, and cost constraints that make upland disposal an infeasible alternative. Among them are:

1. There is no dewatering site available for the temporary stockpiling and dewatering of UDM. A dewatering site is a mandatory element of the upland disposal process.
2. The cost for disposal of large quantities of UDM at landfills is relatively high - about 7-10 times the cost of traditional open water disposal and about three times the cost of CAD disposal. The \$117/cy cost assumes that all 330,000 cy of UDM would be disposed of at once, or at least within a reasonable time frame, so the unit cost for disposal of smaller, isolated projects could be even higher. For example, if a marina owner were to perform 10,000 cy of maintenance dredging (which is typical of dredging projects in Gloucester) and dispose of the material at an upland site (assuming a dewatering site is available), the total cost of the project would be at least \$1.1 million. This capital outlay is beyond the financial capacity of most facilities in the Harbor.

It appears that disposal of small quantities of UDM at landfills that require grading/shaping material would be viable, but only if a dewatering site is available. The cost of this type of disposal is comparable to CAD disposal, but the lack of a suitable dewatering site makes this infeasible at this time.

3. Massachusetts DEP regulations and policies for handling of dredged material, and landfill siting, engineering, and operations are very restrictive. The likelihood for obtaining a permit to site a new landfill, or activate a closed landfill is low and even if a site were to become permitted, it would take 5-7 years to achieve all the necessary approvals. While a large-scale facility sited on that schedule could potentially accommodate the outyear dredging projects, the 5-7 year permitting schedule does not accommodate the 0-5 year dredging need.

DEP is severely restricting the period of time that inactive unlined landfills can be in operation for providing placement of grading and shaping material used for proper capping and closure. The typical timeframe for this is 2 years, which essentially renders the use of these sites unacceptable for the Gloucester DMMP.